PEACE/WILLISTON
FISH & WILDLIFE
COMPENSATION
PROGRAM

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BRITISH
COLUMBIA

Snow Depth Survey
January - March 1990

T. L. Martin
August 1994

PWFWCP Report No. 36

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The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

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This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

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INTRODUCTION

For wildlife species to survive and reproduce, basic life requirements such as food, water, and cover must be available. The potential of the land base to support wildlife under optimal vegetative conditions is described as habitat capability. However, other factors such as predation, interspecific competition and hunting pressure can prevent a species from reaching its carrying capacity even under optimal vegetative conditions. If all requirements of the population are met except one, that one is the limiting factor for population growth. Limiting factors must be identified before effective enhancement or protection of the species can be accomplished. For many wildlife species in the Williston basin, a major limiting factor is the availability of habitat with low snow depths. High snow depths reduce forage availability and restrict an animal's movement resulting in increased energy expenditure for locomotion, foraging and predator avoidance.

In 1990, a snow depth survey was conducted in the Williston Reservoir watershed to identify areas of low snow depth which are suitable ungulate winter ranges. The objective of this report is to present the findings of the 1990 survey. Maps produced from the snow depth survey will be used to identify suitable areas for future enhancement projects and wildlife capability mapping where snow depth is not a limiting factor for ungulates.

METHODS

In total, snow depths were measured at 119 sites throughout the Williston watershed. On January 29, 1990, Rick Dawson (Wildlife Biologist, Peace/Williston Compensation Program) measured snow depths at 50 sites (sites #1-50) in the Parsnip, Finlay, and Omineca areas by helicopter. Between January 29 and March 9, 1990, members of the Mackenzie Forest Management Group measured snow depths at 20 sites (#91-98, #100-108 and #126-128) along logging roads in the Osilinka, Ingenika and east Finlay areas by vehicle. Between February 6 and 9, 1990, 49 snow depth measurements (#51-54, #56-90, #99 and #119-125) were taken in the Ospika, Osilinka, Ingenika and Finlay areas during ungulate surveys conducted by PWCP and BCE personnel. Snow depths for the Peace region were approximated based on observations of animals in March. In addition to the surveys, snow depth measurements for early February 1990 were also obtained from eleven provincial weather stations (#55, #109-118 and #129) located throughout the Williston watershed (Water Management Division, 1990).

To ensure that snow depths were measured in standardized conditions, measurements were collected from microsites that were minimally affected by snow interception, wind, variable temperatures and slope. Preferred sites were small forest openings (one to three tree-lengths in diameter) on flat ground (0-10% slope). Measurements were taken only at sites which were unlikely to be disturbed in the three years following the survey. Snow depth measurements were primarily collected at low elevation sites (< 1000m); a few higher elevation measurements were

obtained from the provincial weather stations. The location of sample sites and weather stations are shown on 1:250,000 scale topographic maps in appendix A.

At each site, three to five measurements approximately 1 to 3 metres apart were obtained near the centre of the opening. A mean snow depth was then calculated to represent the site. For sites sampled on more than one day, the day with the (mean) deepest snow depth was used to represent the site.

Maps of snow zones in the Williston Basin were developed from the survey data, and snow zones were delineated on 1:250,000 topographic maps.

RESULTS AND DISCUSSION

A summary of the snow depth survey results for the 119 sites monitored is presented in Table 1. Although low snow depths are preferred by all ungulates species, some species are able to tolerate deeper snow than others. For example, the movement of sheep and deer is restricted when snow depths exceed 40 cm while the movement of a calf moose is restricted when snow depths are over 80 cm (Davidson and Dawson, 1990). The 1990 snow depth survey identified several areas where snow depths are low enough for wintering ungulates.

Table 1. Snow depth survey results, January - March, 1990.

Geographic Area	Site Location (sample number)	Elevation (m)	Snow Depth (cm)
Parsnip Reach (east)	Mackenzie (85)	760	100-120
	Tutu Creek - Patsuk Creek (1,2,3,4)	760	60-80
	Yahwa Creek (5)	760	80-100
	Scott Creek (6,7)	760	40-60
	Weston Creek (8,9,10)	760	60-80
	Weston Ann - Finlay Bay (11,12,13,37)	760	40-60
Parsnip Reach (west)	Scovil Creek (50)	760	80-100
	Tsodcitla Lake (47,48,49)	760	60-80, 80-100
	Nation Arm (43,45,46)	760	40-60, 60-80
	Maybeline Lake (42)	900	100-120
	Blackwater Creek (46,87)	760	60-80
	15 Mile Swamp (40,41)	760	20-40, 40-60
Manson River	Manson Ann (38,39,86,89)	760	40-60
	Manson Lakes & Wolverine Lakes (61,63)	800-1000	60-80
	Eklund Creek (35,36,51)	760-900	40-60, 80-100
	Strandberg Creek (33,34,52)	700	60-80

Geographic Area	Site Location (sample number)	Elevation (m)	Snow Depth (cm)
Omineca River	Germansen River (25,26,27,28,32,53,54,56,57)	700-800	60-80, 80-100
	Jackfish Creek (29,30,31)	800-1000	60-80
	Discovery Creek (58,59)	900-1000	100-120
Osilinka River	Lower Osilinka River (22,23,24,125)	800	60-80, 80-100
	Ends Lake (79, 103, 104)	800-900	60-80
	Uslika Lake (105)	800	80-100
	Chudelatsa Lake (80,106)	900-1300	100-120
Mesilinka River	Lower Mesilinka River (78,102)	800	80-100
	Blackpine Lake (82,83,107,108)	900-1000	80-100
Finlay Reach (west)	Raspberry Harbour (20,21,101,123,124)	800	60-80
	Chunamon Creek (19)	700	60-80
	Teare Creek (100)	800	100-120
	Ole Creek (99)	800	80-100
	Factor Ross Creek (18)	800	60-80
Ospika River	Ospika Ann (16,97,98)	700-800	60-80
	Aley Creek (121)	760	60-80
	Balden Creek (119,120)	1100	100-120
	McCusker Creek (64,65 66)	900-1000	80-100, 100-120
Finlay Reach (east)	Tobin Lake (17,18,67,96)	700-900	40-60, 60-80
	Collins Creek (68,95)	700-900	80-100, 100-120
	Davis River (69,70,94)	700-800	80-100, 100-120
	Shovel Creek (93)	700	40-60
	Police Meadow (71,92)	800	40-60
	Rubyred Creek (91)	800	60-80
Ingenika River	Carina Lake (17)	800	60-80
	Ingenika Cone (74,75,76)	1000-1400	40-60, 60-80
	Ingenika Ann (72,126,127,128)	700-800	40-60, 60-80
	Swannell River (84)	1000	80-100
	Ingenika River (73)	800	40-60

Snow depths between 20-80 cm were found along the Omineca River and in the Blackwater area. Snow depths in these areas are low enough to provide winter range for moose, elk, caribou and in some areas deer. Snow depths of 40-80 cm were measured along the Nation Arm, Manson River, Ingenika River and the east side of the Finlay and Parsnip Reaches. Moose, elk and caribou would be able to winter in these areas but deer would be restricted by snow depths exceeding 40 cm.

On the Osilinka River, Ospika River and on the west side of the Finlay Reach, snow depths ranged from 60 cm to over 80 cm. Although most of these areas would be suitable for moose winter range, snow depths exceeding 80 cm at Teare Creek, Uslika Lake and Balden Creek could restrict moose calf movement. Along the Mesilinka River snow depths exceeded 80 cm, however, moose are known to winter in the lower half of the Mesilinka valley.

Snow zones, delineated on 1:250,000 topographic maps, were simplified on to a watershed map for presentation (Figure 1; from Davidson and Dawson, 1990). The map identifies zones of different relative snow depths rather than absolute snow depths, which may vary between years.

Figure 2 illustrates the difference between the February 1990 snow depth and the mean snow depth recorded (based on 7 to 27 years of data, depending on the weather station) for the provincial weather stations in the Williston Basin (Water Management Division, 1993). This figure highlights the variability of snow depth patterns throughout the watershed. At the two low elevation weather stations (Mackenzie A and Bullhead Mtn) snow depths in 1990 were below the mean snow depth for their respective station. Two (Ware Lower and Philip Lake) out of three weather stations at an elevation of 980 m had snow depths greater than the mean for their respective station. Weather stations at elevations over 1000 m had snow depths above the mean for their respective station in 5 out of 6 instances.

Based on data from the eleven weather stations it is not possible to characterize 1990 snow depths in the Williston Basin as above or below average. The snow depth patterns in the Williston Basin can however be characterized as variable and dependent on elevation and location. Future snow depth surveys should take this variability into account and snow depths should be monitored at weather stations in locations and at elevations near where the survey will be conducted. It is important to identify low snow depth areas during years of high snow pack because these areas are likely the core ungulate winter habitats which should be targeted for protection and enhancement.

RECOMMENDATIONS

1. A second snow depth survey would make it possible to identify areas with consistently low snow depths. The results of the second survey would be compared with the 1990 results to determine which areas had low snow depths in both years.

2. The Parsnip and Nation rivers were not extensively surveyed in 1990 and a snow depth survey in the future should identify low snow depth areas in these drainages.

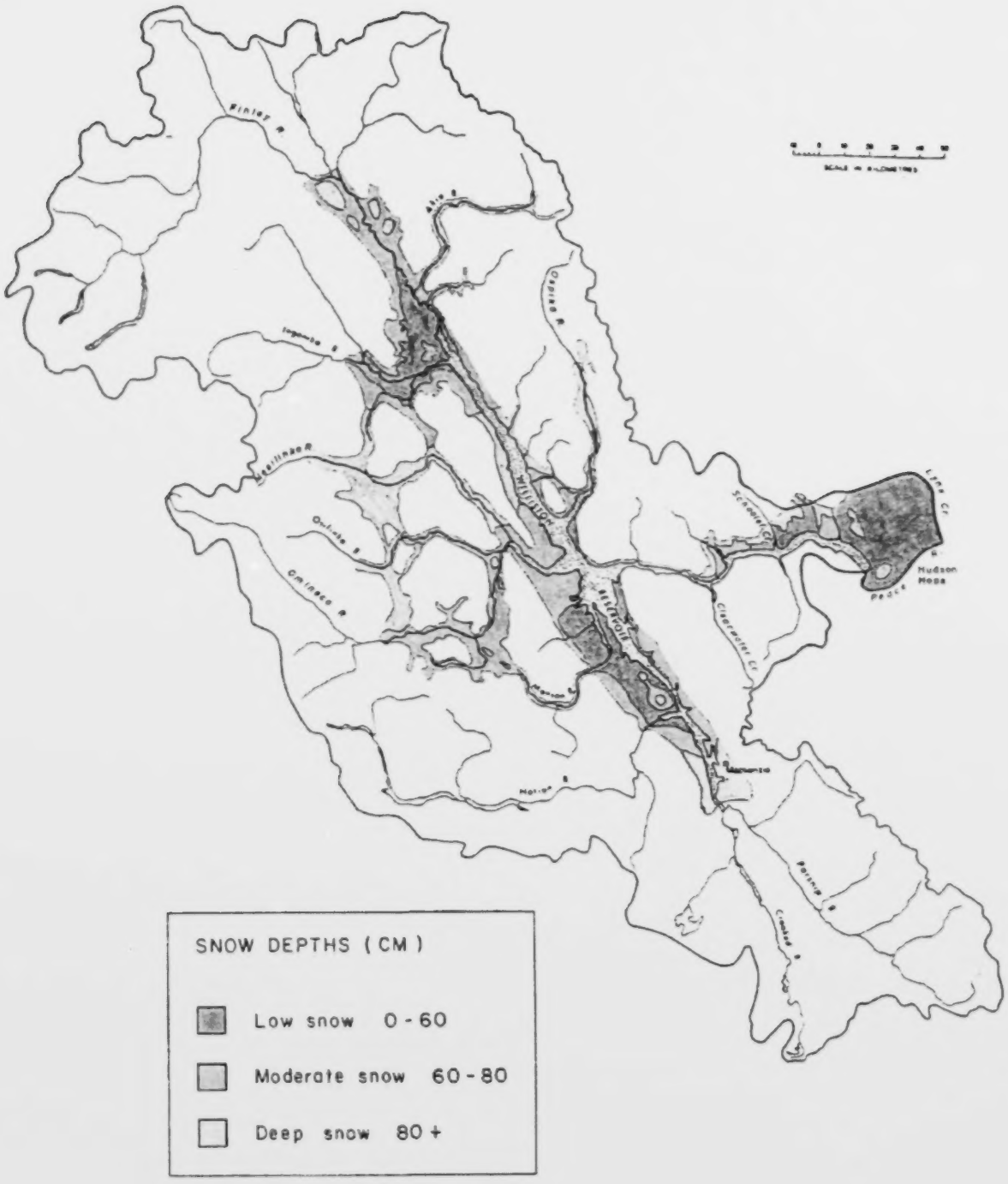


Figure 1. Relative mid-winter snow depth zones in lower elevation areas adjacent to the Williston Reservoir for the evaluation of lowland ungulate winter range capability.

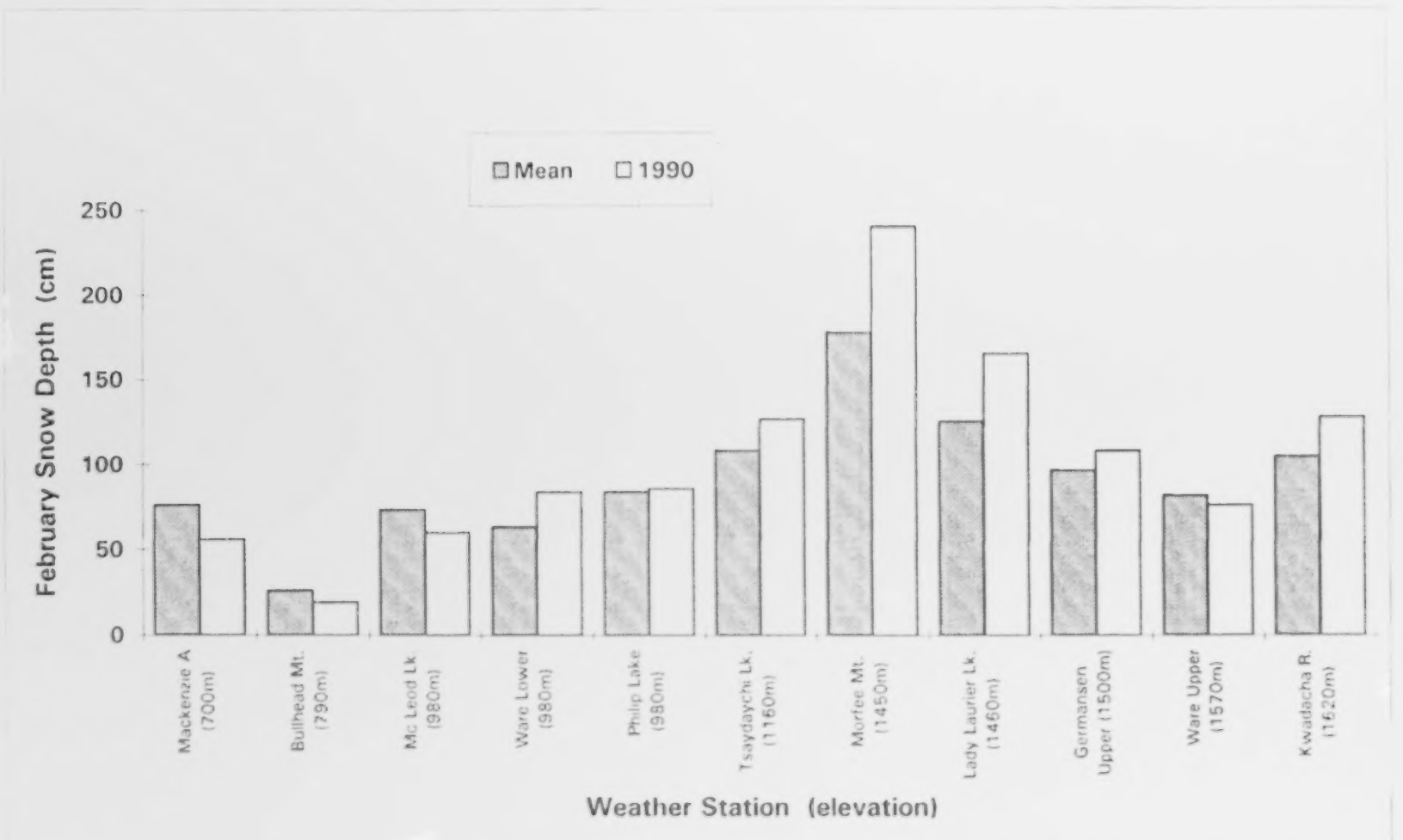


Figure 2. February snow depths (1990 and mean) for eleven weather stations in the Williston watershed.

REFERENCES

Davidson, P., and R. Dawson. 1990. Williston wildlife management plan. Williston Wildlife Compensation Program. Prince George, B.C. 44pp.

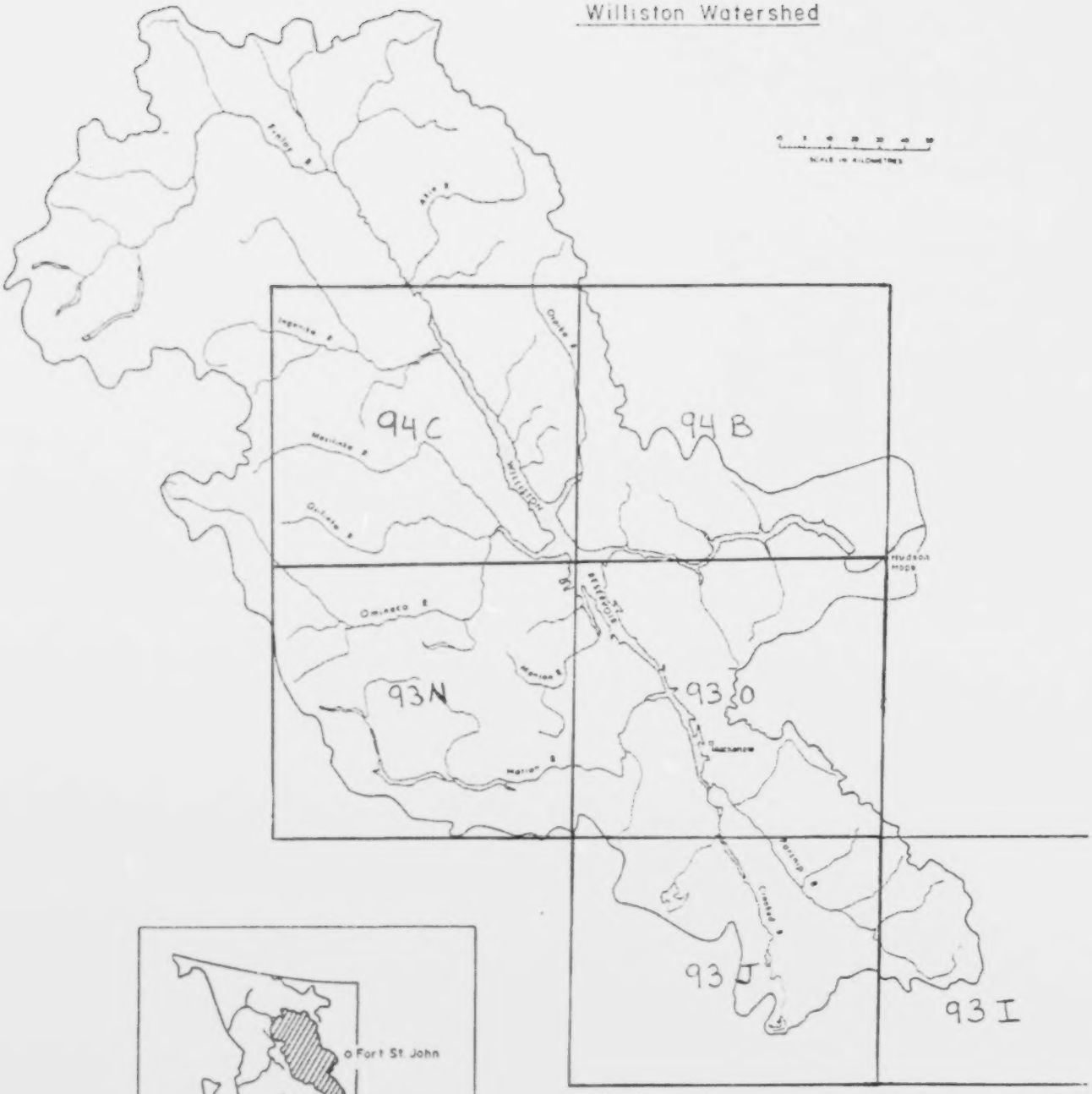
Water Management Division. 1990. Snow survey bulletin, February 1, 1990. B.C. Environment, Victoria, B.C.

Water Management Division. 1993. B.C. snow survey historical summary. Unpubl, data. B.C. Environment, Victoria, B.C.

APPENDIX A

Site Locations and Mean Snow Depths
Maps: 93 N, 93 O, 94 B, 94 C and 94 F

Williston Watershed

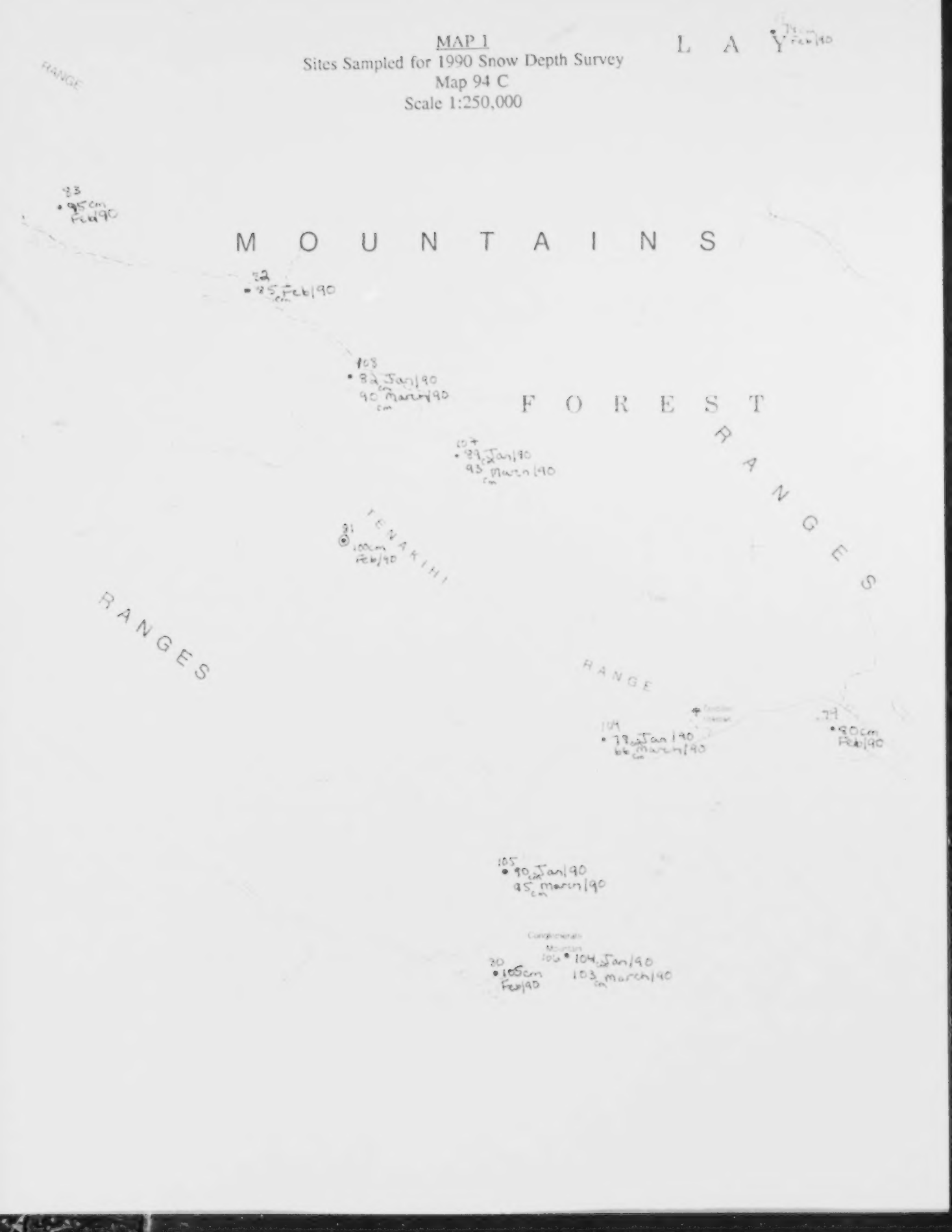


MAP 1

Sites Sampled for 1990 Snow Depth Survey

Map 94 C

Scale 1:250,000



MAP 2

Sites Sampled for 1990 Snow Depth Survey

Map 94 C

Scale 1:250,000

ROUTE

MAP 3
Sites Sampled for 1990 Snow Depth Survey
Map 94 C
Scale 1:250,000

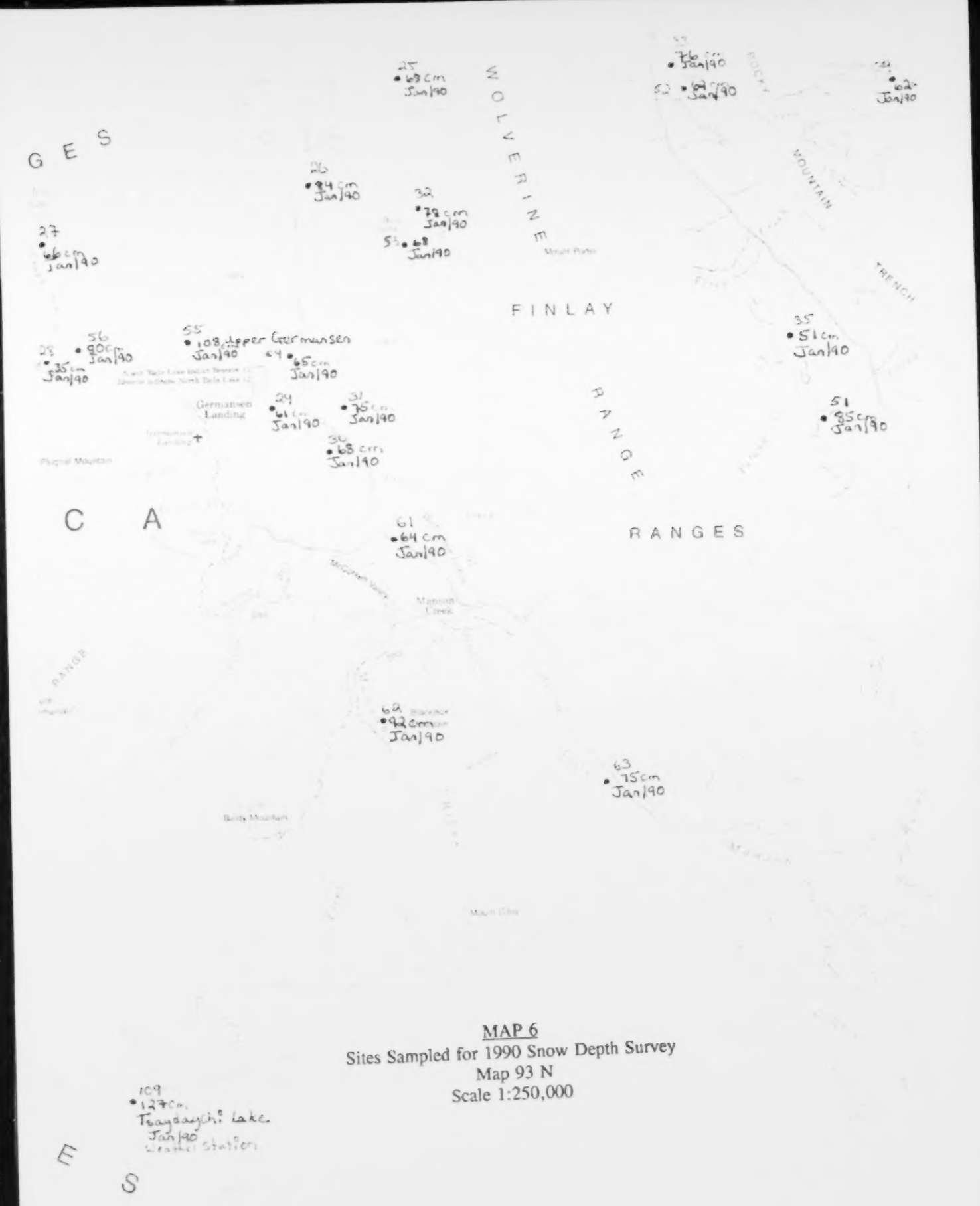
MAP 4

Sites Sampled for 1990 Snow Depth Survey

Map 94 B

Scale 1:250,000

MAP 5
Sites Sampled for 1990 Snow Depth Survey
Map 94 B
Scale 1:250,000

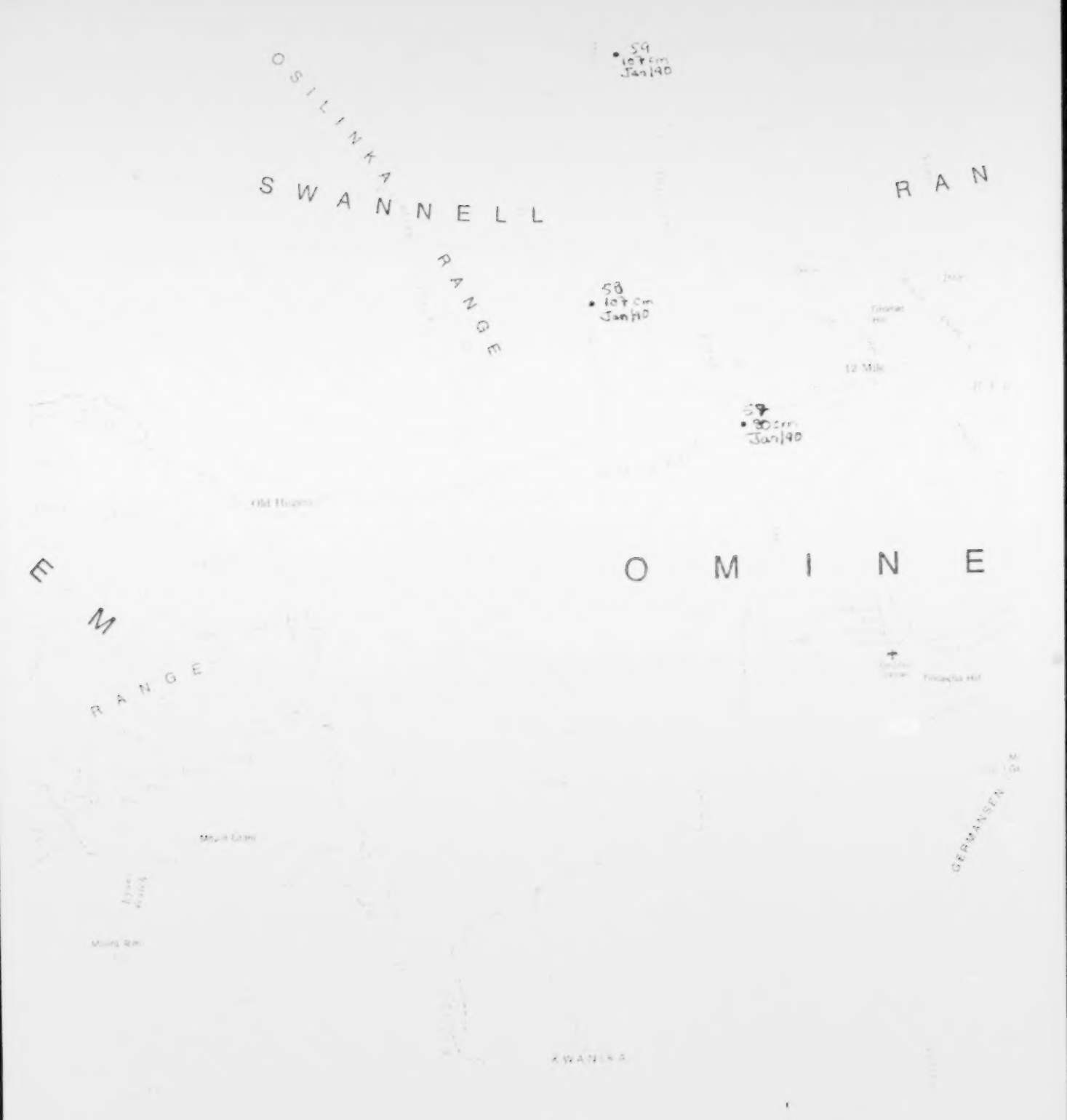


MAP 6

Sites Sampled for 1990 Snow Depth Survey

Map 93 N

Scale 1:250,000



MAP 7
Sites Sampled for 1990 Snow Depth Survey
Map 93 N
Scale 1:250,000

MAP 8
Sites Sampled for 1990 Snow Depth Survey
Map 93 O
Scale 1:250,000

MAP 9

Sites Sampled for 1990 Snow Depth Survey

Map 93 O

Scale 1:250,000

MAP 10

Sites Sampled for 1990 Snow Depth Survey

Map 94 F

Scale 1:250,000